DOCUMENT RESUME

ED 463 674 FL 027 238

| | |
|---|---|
| AUTHOR | Glendinning, Eric; Howard, Ron |
| TITLE | Examining the Intangible Process: Lotus ScreenCam as an Aid to Investigating Student Writing. |
| PUB DATE | 2001-00-00 |
| NOTE | 18p.; For complete journal issue, see FL 027 235. |
| PUB TYPE | Journal Articles (080) -- Reports - Research (143) |
| JOURNAL CIT | Edinburgh Working Papers in Applied Linguistcs; n11 p42-58 2001 |
| EDRS PRICE | MF01/PC01 Plus Postage. |
| DESCRIPTORS | Adult Learning; *Computer Assisted Instruction; *Computer Uses in Education; Cooperative Learning; *English (Second Language); Error Correction; Foreign Countries; *Revision (Written Composition); Student Attitudes; Teaching Methods; *Writing Skills |
| IDENTIFIERS | Scotland |

ABSTRACT

This study examined the changes adult English as a Second Language learners made to a text when writing collaboratively, how learners initiated change, what reasons learners gave for changes they made when writing collaboratively, and the effectiveness of Lotus ScreenCam for researching collaborative computer based writing tasks. Analysis of data from ScreenCam recording of each groups' work and from simultaneous audiotape recordings indicated that in a well-designed collaborative writing activity, learners talked spontaneously about language. The talk and its written product were captured effectively. In the joint composition phase, which most closely resembled the tasks in other studies, learners produced 21 language related episodes (LREs) in 10 minutes, which was fewer than the results from other studies. However, in the sequencing phase, there were 46 LREs in 25 minutes. Learners were able to identify and correct 50 percent of errors without teacher intervention. The largest number of changes to the text involved discourse. Most changes were initiated directly with little comment and without challenge. In 53 percent of the cases, learners provided justification for changes they made to the text. Lotus ScreenCam was effective for this kind of research. (Contains 18 references.) (SM)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 463 674

# EXAMINING THE INTANGIBLE PROCESS: LOTUS SCREENCAM AS AN AID TO INVESTIGATING STUDENT WRITING.

**Eric Glendinning and Ron Howard (IALS)**

*Abstract*

*This study, involving a group of three learners on a full-time EFL course, attempted to gain insight into the process of collaborative writing using word-processing by combining Lotus ScreenCam recordings of the evolving text with audio-recordings of the interaction amongst the group. The approach allowed changes to the text to be matched to the reasons given for each change. In just over half the changes made, learners justified change with reference to grammar or 'feel' for language. However, there was no evidence that justification meant that a proposal was more or less likely to succeed, as almost all proposals were incorporated in the final text.*

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Brian Parkinson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

## 1. Introduction

This research was inspired by a quotation from Hairston (1982):

> We cannot teach students to write by looking only at what they have written. We must also understand how that product came into being, and why it assumed the form it did. We have to try to understand what goes on during the act of writing ... if we want to affect its outcome. We have to do the hard thing, examine the intangible process, rather than the easy thing, evaluate the tangible product.

In seeking to examine the intangible process, we have explored a number of techniques since this research started to gain insight into the process of writing and, as a necessary complement, for recording the product, the written text. Think-aloud protocol, whereby students are encouraged to voice their thoughts to an audio recorder while writing, was rejected without trial on the grounds that it is both unreliable and artificial. We do not voice our thoughts, at least not for sustained periods, while writing, and prompting students each time they fall silent was considered unlikely to aid the process of composition. Similarly, interviewing students after they write on the reasons for the choices and changes they made was considered unreliable and impractical. Even immediately after the event, we are unlikely to recall accurately the reasons for each move in the process of writing. In addition, the time required by researchers to identify the points in the product they wish to discuss leads to delays in interviewing, making the technique even less reliable.

The solution we adopted was to ask student writers to work in groups and to audio-record the interaction amongst the group as they worked together to edit and compose a text. Group work is a long-established procedure in the language classroom and the subjects were familiar with working in this way. The need to justify and explain change and choice to other group members was felt to offset the disadvantage that with group writing it is not possible to track the writing processes of an individual. Change and choice are constrained by the need to compromise with other group members.

Recording the emerging product involved word-processing from the start. In the early days of this research students were asked to save their writing at one-minute intervals in separate files to provide a series of snapshots of the emerging text, but this proved a clumsy instrument. Human error meant that files were frequently overwritten. Asking students to save at this frequency disturbs their concentration. In addition, not all changes can be captured in this way. What is required is a continuous recording of the product to match the continuous audio recording of the process. Videoing the screen is not practical: using a video camera with small groups is an invasive procedure and technical difficulties, the curvature of the screen and the scanning frequency of the computer monitor, mean that not everything on the screen can be recorded clearly. However, feeding the video signal

FL027238



BEST COPY AVAILABLE

from the computer via a specially constructed modem to a video-recorder, so that the emerging product was recorded on videotape, gave excellent results. The procedure is much less invasive, requiring only a microphone in the students' work area.

Other researchers have used computer logs to capture the evolution of text. Some software programs come with a logging facility included, e.g. *Sequitur* (Higgins et al. 1999) and *Jumbler* (Johns & Wang 1999). In other cases, a script can be written to track user behaviour (e.g. Collentine 2000). These techniques have the disadvantage that programming knowledge or the services of a programmer are required, and the output is not easy to read. (see example in Miller, 2000:129.) A rather special case of a logging program is Lotus ScreenCam. As the publicity[1] puts it: "Lotus ScreenCam turns your PC into a VCR that records every click, scroll and action on your screen". The result is a "movie" which can be played back like a video tape. In the case of word-processing, every word typed, deleted, cut and pasted, or dragged to another location is recorded. Furthermore, a "sound-track" can be added if the PC has a microphone and sound card. We therefore decided to test the effectiveness of ScreenCam in studying the writing process. The version used was ScreenCam97.

### 1.1 Research Questions

1. What sort of changes do learners make to a text when they write collaboratively and with what effect?
2. How do learners initiate change and with what effect?
3. What reasons do learners give for the changes they make when they write collaboratively?
4. How effective is ScreenCam as a tool for researching collaborative computer-based writing tasks?

'Learners' in this context means adult learners at intermediate level attending a full-time EFL course at the Institute for Applied Language Studies, University of Edinburgh. 'Collaboratively' means working in a group of three – only one group was looked at in the study reported here.

### 1.2 Related Research

There is an extensive literature on research into writing. The focus here is on attempts to investigate the process of writing using computer technology.

1. In general terms, it is known that problem-solving CALL tasks tend to generate more complex 'off-screen' talk than CALL activities such as cloze completion,(Abraham & Liou 1991; Piper 1986).
2. The advantages of wordprocessing in a process approach to teaching writing have been frequently described, in particular the ease with which major editing changes can be made. Arguments for collaborative writing in a process approach with peers acting as readers and co-editors are also well known. Less frequently described are the advantages of wordprocessing and collaborative writing as tools for researching the process of writing. Groundwater-Smith (1993), although concerned with L1 writers, summarises the benefits of collaborative writing as a means of gaining insight into the writing process: "Each writer must draw the attention of her or his peers to the reasonings underpinning: the selection of a word or phrase, the juxtaposition of ideas and arguments; the raising and resolution of a particular conundrum; the rejection of alternative voices" (Groundwater-Smith 1993:10).

---

[1] http://www.lotus.com/products/screencam.nsf/

3. More recently Swain and Lapkin (1998) examined the language generated by pairs involved in a range of tasks including composition but there are significant differences in the method and the focus of their research. In their case the writing was done without wordprocessing and the research focused on the 'collaborative dialogue' without reference to the emerging written product. In particular, Swain and Lapkin were interested in the evidence that such dialogue provides for language acquisition whereas the research reported here is concerned with the reasons students give for the changes and choices in their writing and for the insight afforded into the writing process.

   Nevertheless, the work of Swain and Lapkin is important for this study. Their concept of the Language Related Episode (LRE) provides a useful tool for describing data collected from the audio recordings. "A LRE episode is defined as as any part of a dialogue where the students talk about the language they are producing, question their language use, or correct themselves or others" (Swain & Lapkin 1998).

4. Storch (1999) investigated whether students working in pairs and discussing their grammatical choices produced more accurate written texts than students working on similar exercises individually. One of the tasks set was a composition. Storch concluded that collaboration and the metatalk it generated resulted in more accurate output. Collaborative compositions had fewer errors, the percentage of error-free clauses increased from 47 to 61%, but were shorter and less syntactically complex than individual work.

## 2. Method

### 2.1 The Task

The task was designed to allow an element of individual composition and of group composition. In addition, the group-editing and composing phases required that attention be paid to discourse features such as cohesion and coherence.

In detail, each participating class was divided into groups of three. Each student in each group was issued with two frames, in the correct sequence, of an eight-frame picture story. The final two frames were not issued. Students were asked to describe in writing their frames using the Past simple and Past progressive as appropriate. As soon as this individual work was completed, students entered their text into a word-processor. Students could comment on each other's texts as they were entered. When all three texts were in place, students could look at each other's pictures. They then had to decide on the correct sequence of the story and rearrange their texts accordingly. When the texts had been resequenced and the subsequent changes necessary to make a coherent, cohesive text had been made, the group had to decide how the story should be completed and give it a title. Teacher comment throughout was kept to a minimum to encourage groups to find their own solution to difficulties, to make their own decisions on changes and choices. When the class had completed the task, groups were able to load in the stories of other groups, make comments and return them to their authors, as the PCs were linked in a LAN. Typically the task took between an hour and an hour a half to complete. In the study reported here approximate times for the the three main phases were: individual typing (15 minutes), joint sequencing and correction of the individual texts (25 minutes), and joint composition of the conclusion to the story (10 minutes). The balance of time was spent reading each other's texts and commenting on them. Students input their own text and took turns at acting as scribe for other phases on an ad hoc basis without teacher intervention.

### 2.2 Data Collection and Analysis

A ScreenCam recording of each group's work at the computer was made, as well as a simultaneous audio-recording of their talk. The audio-recordings were subsequently transcribed. For this pilot study, we selected one good recording and analysed the transcript to identify LREs, adopting Swain & Lapkin's (1995 & 1998) definition. We were able to identify a separate LRE for each language change

in all cases except one, where there was so much overlap that it was impossible to divide the LRE up. In this episode, the students were discussing the sentence 'Two men are leaving a jewellery' in F's first draft.

**Extract 1**

F 'Two men are leaving' ...

G 'were leaving' er It's no good. It's better 'Thieves'

F Yeh

G 'Thieves left jewellery' ... 'left'

F 'left the jewellery'

In this short episode, G and F referred to (1) the use of a present tense verb ('are leaving'), and to lack of cohesion (2) in the subject 'Two men' (since they had already been identified) and (3) in the indefinite article (since the jewellery [sic] had also been mentioned earlier). We counted this as one LRE, although it resulted in 3 changes.

Analysis of the ScreenCam recording was more problematic. It is possible to print out a screen shot capturing each change to the text, but this would require an inordinate number of printouts, and in the end we found it simpler to make a manual note of changes as we watched the film. The notes were then analysed to try to distinguish between changes made for linguistic reasons and those related to the content of the story. The distinction was not always easy. Extract 2 illustrates the problem.

**Extract 2**

J Maybe put 'a few minutes later' ...

F Where?

J 'A few minutes later the ...'

F Here?

J Yeh, yeh.

This discussion involved J's text "The guardian was woken up by some strange sounds", and was classified as a change for discourse reasons, although there is a case for saying it was a content addition.

The LREs were matched with the changes to the text in a grid. A sample of the grid is given in Appendix 1.

The individually written texts, the combined and edited versions, and the jointly composed ending (See Appendix 2) were analysed for surface errors and sentence complexity.

## 3. Results

### 3.1 The learners

A profile of the three students in the group is shown in Table 1. 'Cloze' refers to the IALS placement test. There are 146 items. A score of 50 out of 146 is equivalent to IELTS 5.0 or TOEFL 480; IALS 80 is equivalent to IELTS 6.5 and TOEFL 580.

**Table 1: Student Profiles**

| Name & Nationality | | Gender | Occupation | Cloze 1 (initial) | Cloze 2 (final) |
|---|---|---|---|---|---|
| G | Italian | M | lawyer | 55 | 65 |
| F | Swiss | M | sculptor | 57 | 84 |
| J | Chinese | F | accountant | 54 | 72 |

The pilot study was carried out midway between the two Cloze tests.

### 3.2 The changes

There were roughly 2,400 words[2] of dialogue between the three students in 50 mins, i.e. 48 wpm. About 1,300 words in the recording were about language (54%). Other talk was about the interpretation of the pictures, the task, or computing, plus a little social chat, e.g. *F: to play with the keyboard is much more difficult, no?*

There were 74 LREs, yielding an overall rate of approximately 1.5 LREs/min. There were 7 in the individual phase (15 minutes, i.e. 0.5 LREs/min), 46 in the sequencing/editing phase (25 minutes, i.e. 1.8 LREs/min) and 21 in the composition phase (10 minutes, i.e. 2.1 LREs/min).

A total of 75 changes were made, comprising 66 language changes and 9 content changes. There were 74 LREs but only 66 language changes. This is because

1. on three occasions the LRE did not result in any change at all;
2. on nine occasions the discussion was interrupted and the change delayed until the discussion was resumed in a new LRE, for example LRE 2 and 4 in Appendix 1;
3. two changes were made silently, for example Change 8 in Appendix 1;
4. one LRE (see Extract 1) resulted in three changes.

Table 2 shows that 17 (26%) of the changes concerned discourse. This involved considerations of reference (substituting pronoun for noun, definite for indefinite article, etc.), use of connectives, and avoidance of repetition.

---

[2] Figure based on Microsoft 'Word' count of the LREs.

**Table 2: Language area involved in changes (n=66)**

| Phase | Discourse | Vocabulary | Grammar | Spelling | Punctuation | Mixed | Total |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| Individual | 0 | 3 | 1 | 0 | 1 | 0 | 5 |
| Sequencing | 13 | 8 | 10 | 8 | 1 | 1 | 41 |
| Composing | 4 | 5 | 3 | 3 | 3 | 2 | 20 |
| Total | 17 | 16 | 14 | 11 | 5 | 3 | 66 |

### 3.3 Effectiveness

The original and edited student texts as well as the jointly composed ending are included in Appendix 2. Table 3 shows the number of error-free clauses made in the original drafts and edited versions. Working together, the students were able to correct 50% of errors on average, but the other 50% apparently went unobserved. In editing the texts, new errors were added, making the final versions slightly less accurate than the originals (15 errors/100 words as opposed to an average of 14/100, respectively), although the jointly composed ending to the story was better with only 9 errors/100 words.

**Table 3: Error-free clauses**

| Author | Original texts | Edited texts |
|---|---|---|
| F | 1 (12%) | 0 (0%) |
| G | 2 (29%) | 2 (29%) |
| J | 2 (25%) | 2 (25%) |
| Total | 5 (22%) | 4 (18%) |
| Joint | 4 (57%) | 3 (43%) |

Table 4 shows that there was little or no change in the complexity of the individual contributions after editing, but the jointly composed text was more complex, even with the adjusted figures.

**Table 4: Complexity**

| Author | Original text | | Edited text | |
|---|---|---|---|---|
| | Words/sentence | Clauses/sentence | Words/sentence | Clauses/sentence |
| F | 10.8 | 1.6 | 13.0 | 1.6 |
| G | 16.25 | 1.75 | 17.0 | 1.75 |
| J | 15.75 | 2.0 | 17.0 | 2.0 |
| Joint* | 21.0 (14.0) | 3.5 (2.3) | - | - |

*Failure to divide one very long sentence into two is probably the result of a punctuation oversight. The figures in brackets may therefore be more representative.

Of the 65 language changes, 46 (70%) resulted in an improvement. In three cases a correct form was changed to something which was incorrect. In thirteen cases, an incorrect form was changed to another incorrect form; these involved mainly spelling but include 'afraid about' to 'afraid to'. Four changes did little or nothing to improve the text.

### 3.4 Initiation of changes

On 13 occasions, (17% of LREs), a change was proposed by the authors themselves. Where one person in the group suggested a change to another's text, this was often done quite bluntly (33 LREs, 45%), as in Extract 3, where G was referring to the text '*He was affraid about the consequences*'. The two changes were made without comment from the others.

**Extract 3**

G 'He was afraid' with one 'f' and not 'about' but 'to'...

On other occasions, (28 LREs, 38%), the proposal was more tentative and formulae such as "is better", (e.g. Extract 4), and "don't need" (Extract 11) were used.

**Extract 4**

G No, better...'thieves left the jewellery after robbing it', 'after robbing'. What do you think?

J I don't know

Occasionally, the proposal was in the form of a question (Extract 5).

**Extract 5**

F 'And one of them threw a stong'. A 'stong', that's right? I never heard this word.

J No, maybe a brick

G a brick J a brick

The type of initiation did not affect the outcome, however. Delay in change followed either blunt correction or the more indirect type, and the same was true in the three cases where there was no change at all.

Sometimes, the author of the text under attack intervened, but in most cases this appeared to be merely asking for repetition or clarification, as in Extracts 6 & 7. Only in six instances is there any resistance to change, as in Extract 11. In four of the six cases the resistance was overcome. In two, Extracts 9 and 10, G successfully resisted the change,

**Extract 6**

G You've just written

F What?

G You've just written this.

F Yeh, of course.

**Extract 7**

F 'in the car'

G 'in'?

F Yeh, 'on' the top of the car

There were three occasions when a proposal is ignored or rejected. In Extract 8, J rightly questioned the grammaticality of 'During they disappear ...', but her attempts to justify this were apparently ignored by the two men.

**Extract 8**

J 'during' ... I think 'during' ...

F 'another man ran' ...

J 'during' ...

F 'ran into the shop to see what happened' ...

J I think 'then' ...'when' is better because 'during' always follow ... noun ...

G I think it's better ...

F Yes, but you see ... because..

G What do you think ...

F The car is [?]

J 'When they were disappearing' ...

G What do you think about 'by the time' ...

J I think 'during' always ...

G ... 'the guardian realised about the robbery, they disappeared'

G's suggestion of a completely different structure was eventually adopted.

In the second instance, F seemed to be correcting G's grammar, but he accepted the incorrect form when G insisted.

**Extract 9**

F a monster sentence! He was afraid.....he realised that if he didn't call the police

G hadn't called the police [his situation could get worse.]

Finally, in Extract 10, F suggested that 'it' in 'So he did it' was unnecessary and, being at the keyboard, deleted it. But G insisted on putting it back, claiming:

**Extract 10**

F Lost his job. But I think we don't need this 'it' That's not nice.

G No, no. 'He did it'.

F No. You know you don't need this 'it'. You know what you are talking about.

G In English you must write the subject, even the object. 'He did it'. I'm sure

F Mmm?, yes?

G Yeh, I'm sure. 'He did it'.

F 'So he did it'.

### 3.5 Reasons given (Justification)

There were 35 examples of justification, and 31 cases of no justification for changes made. The following were the main types of justification, with the number of cases in brackets:

1. reference to a rule using metalanguage, (e.g. Extracts 8 and 10) (11 cases)
2. giving a kind of definition of a word, (e.g. Extract 7) (2)
3. giving an example of use, (e.g. Extract 12) (1)
4. vague reference to a rule, (e.g. Extract 11) (8)
5. spelling or punctuation correction, (e.g. Extract 12) (11)
6. Teacher input (2)

**Extract 11**

F 'He saw two men running', just 'running', no 'were'

G No, no, without 'were'

J No 'were'? 'He saw two men' ... Just 'running', why 'run' is ....?

G You don't need the word 'were'

J Why? I think he's ... Oh, yeh, yeh, yes .. 'He saw'

**Extract 12**

F 'from the building site'.. 'site' with 'i'

G 'site' with 'i'?

F Camping site, building site

In 11 cases, learners referred to a language rule, if sometimes obscurely (e.g. Extract 10). In 8 cases, the justification seemed to be by reference to 'feel' for language. The 11 cases of spelling/punctuation correction formed a somewhat separate case. There was no clear association between acceptance of a proposal and justification with a rule.

Justification was normally given proactively when challenging another's work, and, in four cases, when making a self-repair. In only six instances did the justification follow a challenge, (e.g. Extract 10).

Some of the justifications were fairly unconvincing or obscure, (e.g. Extract 10), but they were nevertheless accepted (even when wrong, e.g. Extract 13).

**Extract 13**

G 'to shout', 'shout', 'shout'

F 'to shout'? no '-ed'?

J no '-ed'?

G No? 'shout', 'shout', 'shout'. Or not?

J Dunno

F So, I have to change that?

J Yeh. OK.

### 3.6 Usefulness of ScreenCam

Much of the foregoing analysis would have been impossible without ScreenCam. The ScreenCam recording revealed that some changes (5) were made without any discussion or comment. These were all relatively minor changes e.g. spelling, and occur mainly in Phase 1. They were presumably made by the originator of the error.

More importantly, ScreenCam allowed us to interpret a number of ambiguous or obscure exchanges in the audio recording, for example, Extract 6, which would be difficult or impossible to interpret without a record of what was happening on the computer screen. In fact, by matching the audio with the ScreenCam recording, we see that F had just typed 'Running into the shop he get there to check what happened' in spite of the fact that he had already written 'and the man ran into the shop, probably to see what happened' in the preceding paragraph. Following the above exchange, he deleted the redundant sentence.

Similarly, the short exchange in Extract 7 is in itself incomprehensible, but comparing it with what happened on the screen, where G's original 'on the car' was changed to 'in the car', it is possible to interpret it as follows:

**Extract 7a**

F: This should be *'in'* the car not *'on'*.

G: *'in'*?

F: Yeh, *'on'* means *'on top of the car'*.

## 4. Discussion

Our study demonstrates that in a well-designed collaborative writing activity learners talk spontaneously about language and that the talk and its written product can be captured effectively. In the joint composition phase, which most closely resembles the tasks in other studies, learners in this study produced 21 LREs in 10 minutes compared with Swain & Lapkin (1998) 23 LREs in 23 minutes, and Storch (1998) 45-48 LREs in 45 minutes. However, in the sequencing phase there were 46 LREs in 25 minutes. The greater number of LREs in our study may reflect both the make-up of the students in the group and the nature of the task. In addition, many were quite brief.

Learners were able to identify and correct 50% of errors without teacher intervention, but they failed to correct the other 50%. We can only speculate on the reasons for this failure. They may include time pressure, lack of knowledge (unlikely), distraction, politeness, and lack of commitment. In contrast to the research reported by Storch (1999), overall the resultant text was not more accurate than the individual texts of which in part it was composed, although there was some increase in complexity. On the evidence from this limited study, collaborative writing is not necessarily more accurate than individual writing. Apart from errors which were not corrected, new errors were introduced. Our research records some misinformation about language accepted by the group and incorporated in the text.

The largest number of changes to the text involved discourse – features of cohesion and coherence. Storch (1998:297) found that "Discourse considerations or clues seemed to play a minor role in these grammatical choices, with discourse referred to mainly when students were considering linking ideas". However, her students were engaged in the reconstruction of a text given only the content words, whereas our task involved sequencing.

Most changes were initiated directly with little comment and without challenge. In only seventeen per cent of cases of justification did the author of the text question a proposed change. The lack of challenge to these changes and lack of discussion may be because by this stage in their course the

learners were used to working in groups; they knew each other well; a 'pecking order' had been established to some extent.

In 35 (53%) changes out of 66, learners provided justification for the changes they made to the text. There is no evidence that a proposal that was justified by reference to a rule was more likely to be accepted as all but three proposals were accepted whether justified or not. Excluding corrections to spelling and punctuation, where learners justified their choice in most cases they did so by referring to a rule, with or without appropriate metalanguage. It could be argued that in so doing, these learners demonstrated declarative knowledge (Johnson (1996)). In other cases (23%) they appeared to draw on what Goss (1994) describes as 'feel' for language and what Johnston would include in procedural knowledge.

In the only extended discussions where there appears to be a real attempt to use declarative knowledge to argue, it is tempting to think that a firmer grasp of grammatical rules and of the associated metalanguage might have made the discussion more effective. The implication for teaching would be that more consciousness-raising activities should be introduced into our syllabuses. But more research is required to settle this point.

On the issue of task design, the difficulty of predicting student language use in problem-solving tasks is well known. However, this study demonstrates that task design can to some extent influence the area of talk generated. The task set in this study required individual texts to be sequenced and combined; hence the high proportion of discourse-related LREs. Using a similar approach, it would be possible to design tasks which focus on other areas of language of interest to the researcher, such as tense choice.

ScreenCam in the version we used is an effective if in some ways clumsy instrument for this kind of research. It captures the evolving product and allows the product and the metatalk which accompanies its production to be linked. ScreenCam is Windows-based and relatively simple to use. This gives it a major advantage over the type of logging programme illustrated in Miller (2000) for example. The effect is like watching over the user's shoulder as a text is composed or edited. The recording can be paused and replayed at will. Unfortunately, it is not possible to rewind other than right back to the beginning, and fast forwarding is difficult to control. The recording therefore has to be viewed in real time. This is not only time-consuming but it means that a moment's inattention can mean missing a vital change. In this respect, a logging programme has the advantage. On the other hand, ScreenCam captures information which logging cannot, e.g. movements of the cursor. But other useful visual information, e.g. pointing with the finger at the text on the screen, is not available in either.

Matching ScreenCam with an independent audio recording was not easy, but a simultaneous audio recording would considerably facilitate this task. The addition of a timer to ScreenCam would also be very useful.

In contrast, a video-recording onto tape using the monitor signal permits all the playback controls of a VCR. However, there are disadvantages. There is an additional item of equipment involved and where several groups are working at the same time this poses obvious resource and space problems. In addition, the images are not available in digital form. Analysing the data using different media is clumsy. For example, a printout of the screen cannot be made. For these reasons, ScreenCam is preferable.

The same approach, combining data from audio-recording and ScreenCam, could be used to investigate issues of interlanguage and as a means of providing data for research into features such as 'negotiation of form' (Lyster & Ranta (1997)) and 'noticing', which some consider critical to second language acquisition.

Questions relating to collaborative writing which could be explored using this technique would include:

- Does group writing produce more accurate writing than individual writing?
- Is there any correlation between the amount of metatalk generated by a task and the grammatical accuracy of its product?
- Does group writing prevent individual creativity? (There are traces of ghost texts which individuals would have written.)
- What proportion of individual writing survives in a collaboratively written text?
- Is the finger on the keyboard the most powerful influence in the group - do scribes rule or is the scribe treated as secretary?
- Does proficiency in language correlate with proficiency in writing?
- Are learners good teachers? Is there evidence of scaffolding in such tasks?
- To what extent are sociocultural and gender factors an issue in collaborative writing?

## 5. Conclusions

We acknowledge that any conclusions drawn are based on a very small sample of data. The study is being repeated with a larger sample.

This study provides evidence that Lotus ScreenCam can be a useful tool in the study of the writing process. Using our approach, insights can be gained into the reasons learners give for the changes and choices they make in a collaborative writing task using wordprocessing. Our study also demonstrates how a well-designed writing task can generate a considerable amount of discussion of language. In so doing, it makes a contribution to the questions posed by Chapelle (1997): What kind of language does the learner engage in during a CALL activity? How good is the language experience in CALL for L2 learning? In our case much of the language was about language itself and, if the advocates of the output hypothesis are correct, this type of activity should be a rich source of language learning. Future research with appropriate follow-up may help answer this question.

**Acknowledgements**

We would like to thank John McEwan, IALS Computing Officer, for his technical support and Dr Tony Lynch for test score equivalents.

**References**

Abraham, R. and H-C. Liou. 1991. Interaction generated by three computer programs: analysis of functions of spoken language. In Dunkel, P. (ed.) 1991. *Computer-assisted Language Learning and Testing*. Newbury House.

Chapelle, C.A. 1997. CALL in the Year 2000: Still in search of research paradigms? *Language Learning and Technology*. 2, 1: 22-34.

Collentine, J. 2000. Insights into the construction of grammatical knowledge provided by user-behaviour tracking technologies. *Language Learning & Technology*. 3, 2: 44-57.

Goss, N., Z. Ying-Hua & J. Lantolf. 1994. Two heads may be better than one: Mental activity in second-language grammaticality judgements. In E. Tarone, S.Gass, and A.Cohen (eds) *Research Methodology in SLA*. Hillsdale, NJ: Erlbaum: 263-286, quoted by Swain & Lapkin. 1998: 322.

Groundwater-Smith, S. 1993. Beyond the individual: collaborative writing and the microcomputer. In Monteith, M. ed. 1993. *Computers and Language*. Oxford: Intellect.

Hairston, M. 1982. The winds of change: Thomas Kuhn and the revolution in the teaching of writing. *College Composition and Communication*. 33, 1, quoted in Zamel, V. (1983).

Higgins, J., A. Lawrie & A. Goodith White. 1999. Recognising coherence: the use of a text game to measure and reinforce awareness of coherence in text. *System*. 27, 3: 339-349.

Johns, T. & L. Wang. 1999. Four versions of a sentence-shuffling program. *System*. 27, 3: 329-338.

Johnson, K. 1996. *Language Teaching & Skill Learning*. Oxford: Blackwell.

Lyster, R. & L. Ranta. 1997. *Corrective Feedback and Learner Uptake*. Cambridge: CUP.

Miller, K. M. 2000. Academic writers on-line: investigating pausing in the production of text. *Language Teaching Research*. 4, 2: 123-148.

Piper, A .1986. Conversation and the Computer: A study of the conversational spin-off generated among learners of English as a Foreign Language working in groups. *System*. 14, 2: 187 - 198.

Storch, N. 1998. A classroom-based study: insight from a collaborative text reconstruction task. *ELTJ*. 52, 4: 291-300.

Storch, N. 1999. Are two heads better than one? Pair work and grammatical accuracy. *System*. 27: 363-374.

Storch, N. 2001. How collaborative is pair work? ESL tertiary students composing in pairs. *Language Teaching Research*. 5, 1: 29-53.

Swain, M. and S. Lapkin. 1995. Problems in Output and the Cognitive Processes They Generate: A Step Towards Second Language Learning. *Applied Linguistics*. 16, 3.

Swain, M. and S. Lapkin. 1998. Interaction and second language learning: Two adolescent French immersion students working together. *The Modern Language Journal*. 82, 3: 320-337.

Zamel, V. 1983. The composing processes of advanced ESL students: six case studies. *TESOL Quarterly*. 17, 2: 165 - 187.

**Appendix 1**

| Time | LRE | Original text | Tapescript | Edited text | Change |
|---|---|---|---|---|---|
| 4.55 | 1 | two men ran away front of him | G I use the [?] present continuous because I'm describing the scene, the scene of a crime<br>J Yes<br>G and you?<br>J No<br>G You can change | ran → were runing | 1<br>Gr |
| 6.00 | 2 | | F 'He threw a stong to break a window'? A stong?<br>J I don't find the other word. Do you | | |

| Time | LRE | Original text | Tapescript | Edited text | Change |
|---|---|---|---|---|---|
| | | | know?<br><br>F 'He threw a stone'. It's a stone. It's not a 'g', you mean?<br><br>J OK<br><br>G It's a brick. You use a brick to build a .. It's not exactly a stone. You use a brick to build a palace, building<br><br>F Yes, the red ones | | |
| 8.05 | 3 | Runing away front of him | F? This is not 'in front of him'. 'Two men were running away in front of him'.<br><br>J In front? OK | runing away in front of him | 2<br>Voc |
| 12.10 | 4 | | F Is the object is jewellery so the shop is jeweller's<br><br>G In this picture shows this thing. I can change. | | |
| 13.20 | 5 | Next to him there were | G A lot of bricks, a group of bricks, a lot of bricks?<br><br>F A lot of bricks G A lot | Next to him there were a lot of bricks. | 3<br>Voc |
| 13.50 | 6 | in front of a jewellers. | G Jewellery.<br><br>J Spelling<br><br>F I'm not sure whether..<br><br>G [after Spellcheck] Yeh, jewellery | jewellers → jewellery | 4<br>Voc |
| | 7 | Next to him there were a lot of bricks | F Is this the end of the sentence, 'a lot of bricks'?<br><br>J OK | Next to him there were a lot of bricks. | 5<br>Punct |
| 14.30 | 8 | another man run following them | J Change it. Because the past, r..a..n, yes | run → ran | 6<br>Gr |
| | | in front of him and one of them | | in front of him by th car and one of them | 7<br>Content |
| | | His is not involved | | Hi is not involved | 8<br>Spell |

| Time | LRE | Original text | Tapescript | Edited text | Change |
|---|---|---|---|---|---|
| | | in front of him by the car | | in front of him by a open-door car | 9<br>Content |

**Appendix 2**

**G's original text**

1. There were two men, wearing a mask, | who probably had the intention to commite a crime. |
2. They were on their car | and one of them was putting down a brick in front of a jewellers. |
3. Finally, there was another man, at the entrance of a building in front of the jewellers, |who was waiting for something.|
4. Next to him there were a lot of bricks.|

No. of words =65 No. of sentences = 4 No. of clauses = 7

No. of errors = 6 Error-free clauses = 2 (29%) Errors/words = 9/100

**G's final text**

1. There were two men, wearing a mask, | who probably had the intention to commite a crime. |
2. They were in their car | and one of them took a brick from the building site in front of the jewellery. |
3. There was ^ guardian, at the entrance of a building opposite to the jewellery, | who felt asleep instead of looking after the place. |
4. Next to him there were a lot of bricks. |

No. of words = 68 No. of sentences = 4 No. of clauses = 7

No. of errors = 9 Error-free clauses = 2 (29%) Errors/words = 13/100

Corrected errors = 2 Uncorrected errors = 4 New errors = 5

Correction rate = 33%

**J's original text**

1. One night, a janitor was woken up by some strange sounds. |
2. He went out of the door, | suddenly, he saw two men were running away front of him | and one of them threw a stong to break a window of a shop. |
3. Then they went into the shop from the broken window. |
4. Just then, another man run following them | and shouted: | "stop them!" |

No. of words = 63 No. of sentences = 4 No. of clauses = 8

No. of errors = 9 Error-free clauses = 1 (12%) Errors/words = 14/100

**J's final text**

1. A few minutes later, the guardian was woken up by some strange sounds. |
2. He went out of the door, | suddenly, he saw two men running in front of him by an open-door car | and one of them threw a brick to break a window of a shop. |
3. Then they went into the shop through the broken window. |
4. Just then, another man ran following them | and shout : | "Stop them!" |

No. of words = 68 No. of sentences = 4 No. of clauses = 8

Corrected errors = 6 Uncorrected errors = 3 New errors = 4

No. of errors = 7 Error-free clauses = 2 (25%) Errors/words = 10/100

Correction rate = 67%

**F's original text**

1. Two men are leaving a jewellery. |
2. They are coming out thru a broken window, wearing bags and moving to a car. |
3. A rubbery! |
4. During they dissapear with the car, | another man walks into the shop, probably to see | what ^ happend.|
5. His is not involved | but also not realy interested to catch the criminals. |

No. of words = 54 No. of sentences = 5 No. of clauses = 8

No. of errors = 11 Error-free clauses = 1 (12%) Errors/words = 20/100

**F's final text**

1. Thieves left the place after rubbing the jewellery. |
2. They were coming out through the broken window, wearing bags and moving to their car. |
3. Defenitely a rubbery! |
4. By the time the guardian realised they robbed the jewellery, | the thieves drove off, | and the man ran into the shop, probably to see | what ^ happend. |

No. of words = 52 No. of sentences = 4 No. of clauses = 7

Corrected errors = 6 Uncorrected errors = 5 New errors = 8

No. of errors = 13 Error-free clauses = 0 (0%) Errors/words = 25/100

Correction rate = 55%

**Joint text**

1. He was afraid to the consequences, | because of that he didn't call the police immediatly | but he realized that, | if he hadn't called the police, | his situation could get worse. |
2. So he did it | but as a result he lost his job ...

| | | |
|---|---|---|
| No. of words = 42 | No. of sentences = 2 | No. of clauses = 7 |
| No. of errors = 4 | Error-free clauses = 3 (43%) | Errors/words = 9/10 |